

REMARKS/ARGUMENTS

Claims 1-23 are pending. Claims 1, 10, 19, 22, and 23 have been amended.
No new matter has been introduced and no new issues have been raised.

Claims 1-5, 7-15, 18, and 23

Claims 1-5, 7-15, 18, and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakamura et al. (US 2002/0078296) in view of De Margerie et al. (US 6,859,865).

Applicant respectfully submits that independent claim 1 is patentable over Nakamura et al. and De Margerie et al. because, for instance, they do not teach or suggest first and second secondary storage subsystems coupled to the intermediate storage subsystem and configured to receive the write data from the intermediate storage subsystem, the first secondary storage subsystem including a first secondary volume that is configured to mirror the first primary volume of the first primary storage subsystem which is a separate storage subsystem from the intermediate storage subsystem, the second secondary storage subsystem including a second secondary volume that is configured to mirror the second primary volume of the second primary storage subsystem which is a separate storage subsystem from the intermediate storage subsystem, wherein the write data are stored in the first and second secondary storage subsystems according to the write order information associated with the write data as generated by the write-order-information provider of the intermediate storage subsystem which is a separate storage subsystem from the first primary storage subsystem having the first primary volume and the second primary storage subsystem having the second primary volume.

Applicant respectfully submits that independent claim 10 is patentable over Nakamura et al. and De Margerie et al. because, for instance, they do not teach or suggest an intermediate storage system comprising a write-order-information provider configured to generate write order information for the write data received from the at least one primary subsystem, the write order information being associated with the write data, wherein the write order information is used to store the write data in at least one of the secondary subsystems

which is a separate storage subsystem from the intermediate storage subsystem, so that the at least one secondary subsystem mirrors the at least one primary subsystem.

Applicant respectfully submits that independent claim 23 is patentable over Nakamura et al. and De Margerie et al. because, for instance, they do not teach or suggest an intermediate storage subsystem comprising means for generating write order information for the write data received from the primary subsystems, the write order information being associated with the write data, the write order information providing information as to a write order of the write data, wherein the write order information is used to store the write data in the first and second secondary volumes of first and second secondary subsystems which are separate storage subsystems from the intermediate storage subsystem, the first secondary volume being defined in the first secondary subsystem, the second secondary volume being defined in the second secondary subsystem, wherein the first and second secondary volumes mirror the first and second primary volumes.

Independent claims 1, 10, and 23 have been amended to more clearly point out that the intermediate storage subsystem is a separate storage subsystem from the primary storage subsystems and from the secondary storage subsystems. The intermediate storage subsystem is coupled to the primary storage subsystems to receive the write data. The intermediate storage subsystem includes a write-order-information provider to generate write-order information for the write data. The secondary storage subsystems receive the write data from the intermediate storage subsystem, wherein the write data are stored in the secondary storage subsystems according to the write order information associated with the write data.

The Examiner states that Nakamura et al. discloses first and second secondary storage subsystems S-Vol 111 in Figure 1 and an intermediate storage subsystem (main center 101). The Examiner further states that Nakamura et al. discloses secondary volumes S-Vol 111-1 and 111-2 in secondary storage subsystems 111 configured to mirror primary volumes P-Vol 108-1 and 108-2.

Applicant notes, however, that P-Vol 108-1 and 108-2 are primary volumes of the main center 101, so that the main center 101 includes the primary storage subsystem 102 having the primary volumes P-Vol 108-1 and 108-2. Thus, the main center 101 and the

storage subsystem 102 therein cannot be an intermediate storage subsystem that is a separate storage subsystem from the primary storage subsystem having the primary volumes.

The Examiner cites De Margerie et al. for disclosing first and second primary storages 22a, 22b that are mirrored synchronously by first and second secondary storages 32a, 32b in Figure 1 and column 4, line 54 to column 5, line 35.

Applicant notes, however, that De Margerie et al. does not cure the deficiencies of Nakamura et al., in that it also fails to disclose or suggest an intermediate storage subsystem that is a separate storage subsystem from the primary storage subsystems and from the secondary storage subsystems. Furthermore, neither reference discloses an intermediate storage subsystem having a write-order-information provider to generate write-order information for the write data, wherein the write data are stored in the secondary storage subsystems according to the write order information associated with the write data. The sequence number within the RCU 104 in Nakamura et al. is not generated by a write-order-information provider of an intermediate storage subsystem.

For at least the foregoing reasons, independent claims 1, 10, and 23, and dependent claims 2-5, 7-9, 11-15, and 18, are patentable over Nakamura et al. and De Margerie et al.

Claims 19, 20, and 22

Claims 19, 20, and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakamura et al. in view of De Margerie et al. and Peng (US 2002/0122601).

Applicant respectfully submits that independent claim 19 is patentable over Nakamura et al., De Margerie et al., and Peng because, for instance, they do not teach or suggest associating first write order information to the first write data at the intermediate storage subsystem; associating second write order information to the second write data at the intermediate storage subsystem; transmitting asynchronously the first write data and the first write order information to a first secondary storage subsystem which is a separate storage subsystem from the intermediate storage subsystem; and transmitting asynchronously the second write data and the second write order information to a second secondary storage

subsystem which is a separate storage subsystem from the intermediate storage subsystem, wherein the first and second write data are stored in the first and second secondary subsystems, respectively, according to the first and second write order information.

Applicant respectfully submits that independent claim 22 is patentable over Nakamura et al., De Margerie et al., and Peng because, for instance, they do not teach or suggest code for associating first write order information to the first write data at the intermediate storage subsystem; code for associating second write order information to the second write data at the intermediate storage subsystem; code for transmitting asynchronously the first write data and the first write order information to a first secondary storage subsystem, the first secondary subsystem including a first secondary volume which is a separate storage subsystem from the intermediate storage subsystem; and code for transmitting asynchronously the second write data and the second write order information to a second secondary storage subsystem, the second secondary subsystem including a second secondary volume which is a separate storage subsystem from the intermediate storage subsystem, wherein the first and second write data are stored in the first and second secondary subsystems, respectively, according to the first and second write order information, so that the first and second secondary volumes mirror the first and second primary volumes.

As discussed above, Nakamura et al. and De Margerie et al. do not teach or suggest an intermediate storage subsystem that is a separate storage subsystem from the primary storage subsystems and from the secondary storage subsystems. They further fail to disclose associating first write order information to the first write data at the intermediate storage subsystem; and associating second write order information to the second write data at the intermediate storage subsystem. The sequence number within the RCU 104 in Nakamura et al. is not generated at an intermediate storage subsystem.

Peng is cited for allegedly disclosing a computer program stored and executed in a computer system. Peng, however, does not cure the deficiencies of Nakamura et al. and De Margerie et al.

For at least the foregoing reasons, claim 19 and claim 20 depending therefrom, and claim 22, are patentable over Nakamura et al., De Margerie et al., and Peng.

Claim 21

Claim 21 depends from claim 19, and stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakamura et al. in view of De Margerie et al., Peng, and Hakenberg et al. (US 2003/0198250). The Examiner cites Hakenberg et al. for allegedly disclosing the additional features recited in dependent claim 21.

Applicant respectfully submits that independent claim 21 is patentable over Nakamura et al., De Margerie et al., Peng, and Hakenberg et al. because, for instance, they do not teach or suggest the features recited in claim 19 from which claims 21 depends. Hakenberg et al. does not cure the deficiencies of Nakamura et al., De Margerie et al., and Peng, in that it also fails to teach or suggest the associating steps and the transmitting steps recited in claim 19.

For at least the foregoing reasons, claim 21 is patentable.

Claims 6, 16, and 17

Dependent claims 6, 16, and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakamura et al. in view of De Margerie et al. and Kaiya et al. (US 2003/0028737). The Examiner cites Kaiya et al. for allegedly disclosing the additional features recited in dependent claims 6, 16, and 17.

Applicant respectfully submits that claims 6, 16, and 17 are patentable over Nakamura et al., De Margerie et al., and Kaiya et al. at least due to their dependency from allowable claims 1 and 10, respectively. As discussed above, Nakamura et al. and De Margerie et al. do not teach or suggest an intermediate storage subsystem that is a separate storage subsystem from the primary storage subsystems and from the secondary storage subsystems, and that the intermediate storage system comprises a write-order-information provider configured to generate write order information for the write data received from at least one primary subsystem, the write order information being associated with the write data. Kaiya et al. does not cure the deficiencies of Nakamura et al. and De Margerie et al.

For at least the foregoing reasons, dependent claims 6, 16, and 17 are patentable.

Appl. No.: 10/758,971
Amdt. dated: July 31, 2006
Reply to Office Action of: May 2, 2006

PATENT

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,



Chun-Pok Leung
Reg. No. 41,405

TOWNSEND and TOWNSEND and CREW LLP
Two Embarcadero Center, Eighth Floor
San Francisco, California 94111-3834
Tel: 650-326-2400
Fax: 415-576-0300
RL:rl
60832497 v1